

REMARKS

Applicants gratefully acknowledge Examiner Do for taking time from his busy schedule to conduct a telephone interview including co-inventor Gustavson on June 26, 2007. Dr. Gustavson explained the present invention relative to the cited references. Examiner Do indicated that he thought the independent claims did not adequately reflect the intention conveyed by Dr. Gustavson.

Claims 1-20 are all the claims presently pending in the application. The claim revisions above reflect the discussions during the telephone interview of June 26.

It is noted that the claim amendments are made only for more particularly pointing out the invention, and not for distinguishing the invention over the prior art, narrowing the claims or for any statutory requirements of patentability. Further, Applicant specifically states that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

The Examiner objects to the Abstract as being too short. In response, Applicants respectfully point out that the length of the Abstract is not a statutory constraint and that the content of the Abstract is based upon legal considerations for potential future litigation, not convenience to the USPTO for printing, particularly in view of modern, computerized printing capabilities. That is, these length constraints (e.g., 50-150 words) may or may not have been appropriate in times past, but are certainly obsolete (and somewhat quaint) in the modern printer environment having computerized inputs.

In reality, for legal reasons, the Abstract of the present application intentionally tracks the language of the independent claims in order to preclude alternative construction of the language of these claims by having alternative wording as might be reflected in the Abstract. However, the present revised Abstract would appear to satisfy the Examiner's concern that it is too short, since it incorporates approximately 50 words. Therefore, the Examiner is respectfully requested to reconsider and withdraw this objection.

The Examiner objects to claims 4, 10, and 16 for failing to define "BLAS." Applicants believe the above claim amendments appropriately address this concern and respectfully request that the Examiner reconsider and withdraw this objection.

Claims 1-20 stand rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite. Claims 1-20 stand rejected under 35 U.S.C. § 101 as allegedly directed to

non-statutory subject matter. Claims 1, 2, 5-8, 11-14, 17, and 18 stand rejected under 35 U.S.C. § 102(b) as allegedly anticipated by US Patent 5,099,447 to Myszewski. Claims 3, 4, 9, 10, 15, and 16 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Myszewski, further in view of US Patent 6,675,106 to Keenan et al. Claim 19 stands rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Myszewski, further in view of “PLAPACK: Parallel Linear Algebra Package Design Overview” by Philip (Alpatov) et al. Claims 1-20 stand rejected under nonstatutory obviousness-type double patenting over claims 1, 4, 5, 7-17, 19, and 20 of co-pending application 10/671,934.

These rejections are respectfully traversed in the following discussion.

I. THE CLAIMED INVENTION

As described, for example, by independent claim 1, the claimed invention is directed to a method of improving at least one of speed and efficiency when executing a level 3 dense linear algebra subroutine on a computer, including automatically setting an optimal machine state on the computer for the processing by selecting an optimal matrix subroutine from among a plurality of matrix subroutines stored in a memory that could alternatively perform a level 3 matrix multiplication.

As explained at lines 7-11 of page 4 of the specification, the conventional wisdom for linear algebra processing considers that only one kernel type is available for matrix multiplication. However, as explained at lines 11-14 of page 5, such limitation of having a single kernel available for matrix multiplication forces data copying that limits efficiency of the multiplication processing.

The claimed invention, on the other hand, provides a method to reduce and/or eliminate such data copying by allowing a selection of an optimal kernel for the processing, as selected based on which matrix would most optimally reside in L1 cache.

II. THE 35 USC §112, SECOND PARAGRAPH REJECTION

Claims 1-20 stand rejected under 35 U.S.C. §112, second paragraph, as allegedly being indefinite for allegedly failing to achieve the intent described in the preamble of the independent claims. Although Applicants disagree with this characterization when the claimed invention is viewed as a whole in view of the description in the specification, the independent claims have been amended to describe the invention as a method to improve efficiency and speed of the processing. In this perspective of the present invention, the step

of selecting the most optimal kernel of the six available kernels does indeed achieve the intent defined in the preamble.

In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw this rejection.

III. THE NON-STATUTORY SUBJECT MATTER REJECTIONS

Claims 1-20 stand rejected under 35 U.S.C. §101 for allegedly failing to address statutory subject matter.

As explained by the Examiner during the above-mentioned telephone interview, the Examiner is completely dependent upon the “101 panel” for this rejection and has no control over this conclusion .

In response, Applicants respectfully request that the Examiner/“101 panel” provide a reasonable transparency to the statutory subject matter rejection rationale by providing a sufficient analysis on the record for this rejection and have submitted a petition for a complete response to Assistant Commissioner Doll to this effect.

As noted in this petition, the decisions of the “101 panel” become a “black hole” with no opportunity for Applicants to expedite prosecution or evaluate accountability of the panel’s decision to the actual holdings of case law related to statutory subject matter.

According to the Examiner’s discussion during the telephone interview, Applicants are expected to keep submitting wording proposals for claim language until the “101 panel” is somehow satisfied with some type of magical wording necessary for each panel. Applicants submit that such approach to patent prosecution is both inefficient and inappropriate since there is no way for the public to be able to proceed with prosecution without even knowing the basis for the rejection.

More specifically, according to the rejection of record, the “101 panel” considers that the claimed invention is directed to “... *a method, apparatus, and medium for executing a linear algebra subroutine in [a] computer in accordance with a mathematical algorithm. In order for claims to be statutory, claims must either include a practical/physical application or a concrete, useful, and tangible result. However, claims 1-20 merely disclose steps/components for executing a linear algebra subroutine without further disclosing a practical/physical application or a useful and tangible result. In addition, claims 13-18 as program software resides on non-tangible medium as clearly stated on page 24 lines 10-15.*”

In response, Applicants respectfully submits that the above description

mischaracterizes both the present invention and the holdings of case law related to statutory subject matter.

First, Applicants point out that the present invention is actually directed to a method of improving speed/efficiency in performing level 3 matrix multiplication. It does not claim any “mathematical algorithm” in the abstract nor does it pre-empt any mathematical algorithm, since the level 3 matrix multiplication, to the extent that such level 3 matrix multiplication processing is considered a “mathematical algorithm”, can always be executed in the slower, more inefficient manner of the convention method of using only one kernel.

The present invention introduces to the art the mechanism for improving efficiency for such processing by selecting the most efficient kernel of six possible kernels that could be used for the processing. The results of such selection can be measured in shorter processing time on a computer, thereby clearly providing a “useful, concrete and tangible result”, as required by the *State Street* and the *AT&T* holdings.

Applicants further respectfully submit that the 101 panel’s rationale, as articulated in the rejection currently of record has at least the following deficiencies.

1. The real-world usefulness of the present invention is that of improving the speed and efficiency of a computerized processing. As such, to the extent that the present invention is subject to the “useful, concrete and tangible result” test, such test is inherently satisfied by the claimed invention by its achievement of greater speed/efficiency.

Stated slightly differently, the present invention is related to selecting the optimal machine state to use for the processing of the matrix multiplication. It is well established that a computer programmed to achieve a specific processing defines a unique machine. The present invention, therefore, provides a mechanism for automatically setting up an optimal machine state for the matrix multiplication processing.

The present invention is not directed to claiming either the mathematical algorithm in the abstract nor even to the actual processing of the algorithm.

2. Contrary to the implication in the 101 panel’s conclusion as articulated in the rejection currently of record, there is not, and never has been, a case law holding that states that any invention related to “... executing a linear algebra subroutine in [a] computer in accordance with a mathematical algorithm” is inherently non-statutory. The non-statutory subject matter preclusion related to mathematical algorithms is directed to the pre-emption of such mathematical algorithms, not to the improvement in processing efficiency. The present invention’s method of improving efficiency is neither claiming the processing of the

mathematical algorithm itself, nor does it pre-empt anyone from processing these matrix multiplication subroutines in the conventional manner of using only one possible kernel.

3. Moreover, contrary to the implication of the 101 panel's conclusion that the present invention fails to provide practical/physical applications for the matrix multiplication processing for which the present invention is directed, Applicants point out that the specification describes the "real world" applications in at least lines 13-16 on page 1.

4. Relative to the 101 panel's conclusion for claims 13-18, these claims are directed to "Beauregard claims", as discussed in *In re Beauregard*, 53 F.3d 1583 (Fed Cir. 1995). US Patent 5,710,578 to Beauregard et al. issued on January 20, 1998, for such claims.

5. Relative to the 101 panel's conclusion that "... claims 13-18 as program software resides on non-tangible medium as clearly stated in page 24 lines 10-15", Applicants bring to the panel's attention that the plain meaning of the claim language (e.g., "... medium tangibly embodying a program of machine-readable instructions executable by a digital processing apparatus ...) itself precludes this interpretation. The panel is clearly engaging in improper importation into the claim interpretation when the plain meaning of the language of the claim itself precludes such interpretation.

Moreover, along this line, Applicants respectfully submits that the panel also improperly interprets the language at lines 10-15 on page 24, since these lines clearly define that the instructions are stored in a variety of media. There is no suggestion of claiming "energy" or "natural phenomena" in the abstract, as is the classical interpretation of these lines by Examiners. Rather, to one having ordinary skill in the art, these lines clearly describe that the computer program can be stored in a number of media. To the extent that the panel is relying upon the wording in the final sentence (e.g., "... including transmission media such as digital and analog and communication links and wireless"), Applicants bring to the panel's attention that this description refers to a computer process that is defined by these instructions. Accordingly, this description on page 24 is one of the four categories specifically identified as statutory subject matter (e.g., a "process").

IV. THE PRIOR ART REJECTIONS

The Examiner alleges that Myszewski teaches the claimed invention defined by claims 1, 2, 5-8, 11-14, 17, and 18, and, when combined with the teachings of Keenan, renders obvious claims 3, 4, 9, 10, 15, and 16, and when combined with the teachings of Philip, renders obvious claim 19.

Applicants submit, however, that there are elements of the claimed invention which are neither taught nor suggested by Myszewski, even if combined by either Keenan or Philip.

As clearly described in the Abstract, Myszewski discloses a method of matrix multiplication that involves an interleaving reads from memory with calculations. Although this method arguably improves efficiency for matrix multiplication, it provides a method entirely different from the manner of the present invention having a mechanism of automatically setting the optimal machine state by selecting an optimal matrix subroutine from among a plurality of matrix subroutines stored in a memory that could alternatively perform a level 3 matrix multiplication.

The Examiner points to lines 55-64 of column 4, lines 34-55 of column 14, and to columns 15-18 of Myszewski as satisfying the description in the independent claims for selecting an optimal subroutine from a plurality of subroutines that could perform the level 3 matrix multiplication.

Applicants respectfully submit that lines 55-64 of column 4 relate to the procedure of determining an optimal block size, not selection of one of alternative subroutines that could alternatively be used for the processing. Similarly, there is no suggestion in lines 34-55 of column 14 or in columns 15-18 of selecting an optimal one of several possible subroutines to perform the processing.

The Examiner relies upon secondary references Keenan and Philip for reasons unrelated to overcoming this basic deficiency of primary reference Myszewski, so that neither of these secondary references overcome the deficiency of the primary reference.

Hence, turning to the clear language of the claims, in Myszewski there is no teaching or suggestion of: “...automatically setting an optimal machine state on said computer for said processing by selecting an optimal matrix subroutine from among a plurality of matrix subroutines stored in a memory that could alternatively perform a level 3 matrix multiplication processing”, as required by independent claim 1. The remaining independent claims have similar language.

Therefore, Applicant submits that there are elements of the claimed invention that are not taught or suggest by Myszewski, and the Examiner is respectfully requested to withdraw this rejection.

Relative to the rejections based on combining secondary references Keenan or Philip with Myszewski, Applicants submit that neither secondary reference overcomes the deficiency of the primary reference, so that all claims are clearly patentable over Myszewski,

even if combined with these two secondary references.

V. THE DOUBLE PATENTING REJECTION

Claims 1-20 stand rejected under nonstatutory obviousness type double patenting over claims 1, 4, 5, 7-17, and 19-20 of co-pending application S/N 10/671,934. In response, Applicants respectfully submit that co-pending application S/N 10/671,934 relates to a specific technique of streaming of data for level 3 matrix multiplication processing, not to the selection of an optimal subroutine for performing the processing. These procedures are clearly patentably distinct by reason of providing two distinctly different results, as discussed during the above-mentioned telephone interview on June 26.

VI. FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicant submits that claims 1-20, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Assignee's Deposit Account No. 50-0510.

Respectfully Submitted,



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